ENVIRONMENTAL AND EXPERIMENTAL BOTANY

An International Journal

Editor-in-Chief: MORTON W. MILLER, Rochester

VOLUME CONTENTS, AUTHOR AND SUBJECT INDEX

VOLUME 31, 1991

PERGAMON PRESS
Oxford New York Seoul Tokyo

ENVIRONMENTAL AND EXPERIMENTAL BOTANY

Editor-in-Chief

MORTON W. MILLER, Department of Biophysics, The University of Rochester, School of Medicine and Dentistry, Rochester, NY 14642, U.S.A. (Tel. (716)275-3634)

Editorial Board

S. I. AUERBACH, Oak Ridge National Laboratory, Oak Ridge, TN, U.S.A.
P. BARLOW, University of Bristol Research Station, U.K.
J. P. BENNETT, University of Wisconsin, Madison, WI, U.S.A.
P. F. BOURDEAU, Comm. of the European Commun., Brussels, Belgium
J. BRYAN, Syracuse University, Syracuse, NY, U.S.A.
A. D. CONGER, Temple University School of Medicine, Philadelphia, PA, U.S.A.
B. V. CONGER, University of Tennessee, Knoxville, TN, U.S.A.
M. J. CONSTANTIN, Phyton Technologies Inc., 7327 Oak Ridge Highway, Knoxville, TN, U.S.A.
F. D'AMATO, Ist Di Genetica Della Univ., Pisa, Italy
D. DAVIDSON, McMaster University, Hamilton, Ont., Canada
D. R. DAVIES, John Innes Institute, Norwich, U.K.
L. S. EVANS, Manhattan College, Bronx, NY, U.S.A.
J. S. JACOBSON, Boyce Thompson Institute, Ithaca, NY, U.S.A.
B. A. KIHLMAN, Royal Agr. College of Sweden, Uppsala, Sweden
R. M. KLEIN, University of Vermont, Burlington, VT, U.S.A.
W. H. KLEIN, 7901 Kentbury Dr., Bethesda, MD 20814, U.S.A.
C. KONZAK, Washington State University, Pullman, WA, U.S.A.
C. C. KUEHNERT, Syracuse University, Syracuse, NY, U.S.A.
C. LUTZ, GSF München, Institut für Biochemische Pflanzenpathologie, Neuherberg, F.R.G
B. L. MCMICHAEL, USDA-ARS, Lubbock, TX, U.S.A.
S. MCNAUGHTON, Syracuse University, Syracuse, NY, U.S.A.
J. MOUTSCHEN, University of Liège, Liège, Belgium
P. E. PILET, Inst. Biologie/Physiologie Veg., Université de Lausanne, Lausanne, Switzerland
D. J. RAYNAL, SUNY—Coll. Envir. Sci. and Forestry, Syracuse, NY, U.S.A.
R. J. ROMANI, University of California, Davis, CA, U.S.A.
J. R. K. SAVAGE, MRC Radiobiology Research Unit, Berkshire, U.K.
J. L. SEAGO, SUNY Biology, Oswego, NY, U.S.A.
M. S. SWAMINATHAN, Teynampet, Madras, India
D. T. TINGEY, U.S. EPA, Corvallis, OR, U.S.A.
J. C. V. VU, USDA-ARS Hort. Res. Lab., Orlando, FL, U.S.A.
P. L. WALNE, University of Tennessee, Knoxville, TN, U.S.A.
P. WEBSTER, University of Massachusetts, Amherst, MA, U.S.A.
H. YAMAGATA, Kyoto University, Kyoto, Japan
H. YAMAGUCHI, University of Tokyo, Tokyo, Japan

Editorial Assistant: MARYLYNN M. MILLER

Publishing, Subscription and Advertising Offices
Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, U.K.
Pergamon Press Inc., 395 Saw Mill River Road, Elmsford, NY 10523, U.S.A.

Annual Institutional Subscription Rate (1992): £230 (U.S. $370).
Two-year Institutional Rate (1992/93): £437 (U.S. $703). Sterling prices are definitive. U.S. dollar prices are quoted for convenience only, and are subject to exchange rate fluctuation. Prices include postage and insurance and are subject to change without notice.
Personal subscription rate for those whose library subscribes at the regular rate available on request.
Subscription rates for Japan are also available on request.

Microform Subscriptions and Back Issues
Back issues of all previously published volumes, in both hard copy and on microform, are available direct from Pergamon offices.

Whilst every effort is made by the Publisher and editorial board to see that no inaccurate or misleading data, opinions or statement appear in this journal, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the sole responsibility of the contributor or advertiser concerned. Accordingly, the Publisher, the editorial board and editors and their respective employees, officers and agents accept no responsibility or liability whatsoever for the consequences of any such inaccurate or misleading data, opinion or statement.

Published Quarterly Copyright © 1991 Pergamon Press plc

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the Publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

Photocopying information for users in the U.S.A. The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying, beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of $3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970.

Permission for other use. The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the Publisher for such copying.

♾ The text paper used in this publication meets the minimum requirements of the American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39,48–1984.

The Item-Fee Code for this publication is: 0098-8472/91 $3.00 + 0.00.

CONTENTS VOLUME 31

NUMBER 1

M. L. Abbott and L. Fraley, Jr	1	A review: radiotracer methods to determine root distribution
M. Beauregard	11	Involvement of sulfite and sulfate anions in the SO_2-induced inhibition of the oxygen evolving enzyme Photosystem II in chloroplasts: a review
M. Havaux, R. J. Strasser and H. Greppin	23	Effects of incident light intensity on the yield of steady-state chlorophyll fluorescence in intact leaves. An example of bioenergetic homeostasis
D.-P. Häder and M. Häder	33	Effects of solar and artificial u.v. radiation on motility and pigmentation in the marine *Cryptomonas maculata*
G. J. Strydom, J. van Staden and M. T. Smith	43	The effect of gamma radiation on the ultrastructure of the peel of banana fruits
R. A. Armstrong	51	Competitive interactions between four foliose lichens on north and south facing rock surfaces
H. Barthou and R. Buis	59	Kinetics of apical phyllogenesis of the main stem of soybean (*Glycine max* (L.) Merr.): effects of stand density
G. S. Edwards, N. T. Edwards, J. M. Kelly and P. A. Mays	67	Ozone, acidic precipitation, and soil Mg effects on growth and nutrition of loblolly pine seedlings
R. Knittel and E. J. Pell	79	Effects of drought stress and simulated acidic rain on foliar conductance of *Zea mays* L.
S. R. Pezeshki, S. W. Matthews and R. D. DeLaune	91	Root cortex structure and metabolic responses of *Spartina patens* to soil redox conditions
K. Ewing, S. R. Pezeshki and W. Stepniewski	99	Spectral properties of maize as related to soil oxidation–reduction condition
J. R. Pardales, Jr, Y. Kono and A. Yamauchi	107	Response of the different root system components of sorghum to incidence of waterlogging
M. E. Musgrave, A. G. Hopkins, Jr and C. J. Daugherty	117	Oxygen insensitivity of photosynthesis by waterlogged *Apios americana*
Z. Miszalski	125	Influence of DDTC on SO_2 effect on tomato seedling (*Lycopersicon esculentum* Mill.) photosynthesis
Announcement	131	

NUMBER 2

A. Dua and S. K. Sawhney	133	Effect of chromium on activities of hydrolytic enzymes in germinating pea seeds
R. M. Klein, G. J. Badger and K. Novak	141	Metal ion concentrations in red spruce foliage over time
R. Bell and A. H. Teramura	145	Soil metal effects on the germination and survival of *Quercus alba* L. and *Q. prinus* L.

R. J. Bennet and C. M. Breen 153 The recovery of the roots of *Zea mays* L. from various aluminium treatments: towards elucidating the regulatory processes that underlie root growth control

M. L. Abbott, L. Fraley, Jr and T. D. Reynolds 165 Root profiles of selected cold desert shrubs and grasses in disturbed and undisturbed soils

L. M. Bellani, C. Rinallo and A. Bennici 179 Cyto-morphological alterations in *Allium* roots induced by surfactants

B.-R. Huang, H. M. Taylor and B. L. McMichael 187 Behavior of lateral roots in winter wheat as affected by temperature

C. Gay, F. Corbineau and D. Côme 193 Effects of temperature and oxygen on seed germination and seedling growth in sunflower (*Helianthus annuus* L.)

M. Torres, G. Frutos and J. M. Duran 201 Sunflower seed deterioration from exposure to u.v.-C radiation

T. Arnott and T. M. Murphy 209 A comparison of the effects of a fungal elicitor and ultraviolet radiation on ion transport and hydrogen peroxide synthesis by rose cells

K. Strube, D. Janke, R. Kappler and U. Kristen 217 Toxicity of some herbicides to *in vitro* growing tobacco pollen tubes (the pollen test)

L. Balaguer and E. Manrique 223 Interaction between sulfur dioxide and nitrate in some lichens

K. Boonpragob and T. H. Nash III 229 Physiological responses of the lichen *Ramalina menziesii* Tayl. to the Los Angeles urban environment

R. A. Armstrong 239 The influence of climate on the dispersal of lichen soredia

S. Ichikawa and C. Ishii 247 Validity of simplified scoring methods of somatic mutations in *Tradescantia* stamen hairs

Booklet Review
H. D. Maillie 253 *Focus on Nature Conservation*, No. 24, *Radioactivity and Wildlife*, by V. H. Kennedy, A. D. Horrill and F. R. Livens

NUMBER 3

A. Grauby, H. Augier, R. Lion and O. Charlent 255 Neutron activation analysis of elemental composition in a marine phanerogam, *Posidonia oceanica* (L.) Delile: a biological indicator of pollution

P. N. Joshi, B. Biswal and U. C. Biswal 267 Effect of u. v.-A on aging of wheat leaves and role of phytochrome

F. Cuny et A.-C. Roudot 277 Germination et croissance pollinique *in vitro* du pollen de melon (*Cucumis melo* L.) après irradiations gamma

F. Y. Hafeez, S. Asad and K. A. Malik 285 The effect of high temperature on *Vigna radiata* nodulation and growth with different bradyrhizobial strains

J. L. Hatfield and J. J. Burke 295 Energy exchange and leaf temperature behavior of three plant species

R. E. Stafford, B. L. McMichael and J. J. Burke 303 Genetic variation for stress-related traits in guar

C. N. Rosendahl and S. Rosendahl 313 Influence of vesicular–arbuscular mycorrhizal fungi (*Glomus* spp.) on the response of cucumber (*Cucumis sativus* L.) to salt stress

F. Murray and S. Wilson 319 The effects of SO_2 on the final growth of *Medicago truncatula*

C. S. Hew, Q. S. Ye and R. C. Pan 327 Relation of respiration to CO_2 fixation by *Aranda* orchid roots

M. Iijima, Y. Kono, A. Yamauchi and J. R. Pardales, Jr 333 Effects of soil compaction on the development of rice and maize root systems

S. Mariko, Y. Harazono, N. Owa and I. Nouchi 343 Methane in flooded soil water and the emission through rice plants to the atmosphere

G. E. Walsh, D. E. Weber, M. T. Nguyen and L. K. Esry 351 Responses of wetland plants to effluents in water and sediment

P. P. Jackson, N. J. Robinson and B. A. Whitton 359 Low molecular weight metal complexes in the freshwater moss *Rhynchostegium riparioides* exposed to elevated concentrations of Zn, Cu, Cd and Pb in the laboratory and field

J. Garty and J. Delarea 367 Localization of iron and other elements in the lichen *Nephroma arcticum* (L.) Torss.

NUMBER 4

M. W. Miller 377 Editorial: More on the accuracy of journal references

J. A. Harper 379 Editor's Invited Review: Reference accuracy in *Environmental and Experimental Botany*

S. B. Idso 381 A general relationship between CO_2-induced increases in net photosynthesis and concomitant reductions in stomatal conductance

A. Mostowska, D. Fiett and E. Parys 385 Influence of 1,10-phenanthroline, a photodynamic herbicide, on the ultrastructure of mesophyll cells and photosynthetic activity in greening pea seedlings

J. R. Pardales, Jr, A. Yamauchi and Y. Kono 397 Growth and development of sorghum roots after exposure to different periods of a hot root-zone temperature

S. Bedi 405 Plasticity of phenotypic expression in cultured shoot explants of *Pinus caribaea* Morelet

M. Sanda-Kamigawara, S. Ichikawa and K. Watanabe 413 Spontaneous, radiation- and EMS-induced somatic pink mutation frequencies in the stamen hairs and petals of a diploid clone of *Tradescantia*, KU 27

A. K. Thukral 423 A model for the accumulation and decomposition of litter biomass

D. M. Olszyk, B. K. Takemoto and M. Poe 427 Leaf photosynthetic and water relations responses for "Valencia" orange trees exposed to oxidant air pollution

M. Ashraf and H. Yasmin 437 Differential waterlogging tolerance in three grasses of contrasting habitats: *Aeluropus lagopoides* (L.) Trin., *Cynodon dactylon* (L.) Pers. and *Leptochloa fusca* (L.) Kunth.

A. M. Zobel and S. A. Brown 447 Furanocoumarin concentrations in fruits and seeds of *Angelica archangelica*

J. E. Quisenberry and B. L. McMichael 453 Genetic variation among cotton germplasm for water-use efficiency

B. L. McMichael and J. E. Quisenberry 461 Genetic variation for root–shoot relationships among cotton germplasm

B.-R. Huang, H. M. Taylor and B. L. McMichael 471 Growth and development of seminal and crown roots of wheat seedlings as affected by temperature

E. Perona, E. Marco and M. I. Orús 479 Alteration of dinitrogen fixation and metabolism in cyanobacterium *Anabaena* PCC 7119 by phosphamidon

Volume Contents, Author and Subject Index for Volume 31, 1991 i